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GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Annual Reports of the Society; Meetings of January. The annual meeting of the American Geographical Society was held on Tuesday evening, January 22, at the Engineering Societies' Building, 29 West Thirty-ninth Street. The annual reports of the Council, of the Treasurer, and of the Special Committee were read, as follows:

REPORT OF THE COUNCIL

January 17, 1918.

To the Fellows of the American Geographical Society:

The activities of the Society during the past year are an indication of the progress made by it in the realization of its ideal of public service. In outlining these activities the following divisions may be considered: (1) special work in connection with the war, (2) Department of Exploration and Research, (3) the *Geographical Review,* (4) special publications, (5) lectures, and (6) library.

The first thought of every one has been in some connection with the Great War, and our organization has been no exception to the rule. It has been our good fortune to be able to be of material service by rendering available to the military forces of the country our collection of topographical and other maps, so that some fifteen hundred of them were used by the United States forces at their advent in France. We have also been employed by the Government to do some extended work which we are led to believe has been of much utility.

Communications abroad have been much interrupted but, nevertheless, we have maintained our exchanges with nearly four hundred foreign correspondents, so necessary to our program of affording the broadest possible field of information in the *Review.*

The most important single advance in the development of the Society has been the foundation of a Department of Exploration and Research. This work, which the Council have long aspired to attempt, has been rendered possible by the generosity of a valued Councilor. Funds have been secured for a broad program of work in 1918, to be described in detail in an early number of the *Review.* With the establishment of a definite program of research the Society has now an organization which will enable it to exercise the functions of a geographical institute, as the term is employed abroad.

The *Geographical Review,* which is the principal medium of the Society in communicating with its Fellows and with the outside world, has been maintained at a high level, and we have received many compliments upon our success in making the publication a judicious combination of scientific and popular geography. We have been able to present a large number of maps, prepared by our own staff, whenever essential to explain the text of any article, and we have had recourse somewhat more freely to half-tone illustrations in connection with the printed matter.

The second of a series of monographs, issued to members desiring it, was entitled "The Frontiers of Language and Nationality in Europe," by Leon Dominian, and the work appeared at an opportune time, as evidenced by the fact that it has been extensively quoted and referred to by writers upon the burning topics arising out of the European conflict. During the current year the Society expects to issue a striking book, exceptionally well illustrated, which will deal with the relation of physical geography to military strategy on the European battle fronts. There has also been prepared by a special emissary of the Society, sent to Petrograd for the purpose, a translation and review of the diaries kept by the mariner Bering during his Northwest voyages. This original matter will, it is thought, prove of interest.

The semi-monthly lectures, delivered in this city during the winter, were carefully selected and were largely attended by our local membership. Addresses were delivered by the following lecturers: Eric Mjöberg, William Curtis Farabee, B. R. Baumgardt, Arthur L. Day, J. Russell Smith, Theodore Roosevelt, George W. Goethals, LeRoy Jeffers, Donald B. MacMillan, and Theodoor de Booy.

Additions to the Library comprise 1283 books, 525 pamphlets, 828 periodicals, 36 atlases, and 1628 maps. Much progress has been made in continuing the binding of unbound publications, rendering them much more convenient for reference. It is hoped that the ensuing year will witness the substantial completion of this labor.

At the official celebration of the opening of the Croton Aqueduct the Society was invited to participate and prepared an interesting exhibit of maps and historical material bearing upon the subject.

The number of Fellows at the date of this report is 3,586, of whom 381 are Life Fellows. The increase during the year numbers 799.

Four gold medals of the Society have been awarded, as follows:

The David Livingstone Centenary Medal to Theodore Roosevelt in recognition of his original work as an explorer in Brazil.

The Cullum Geographical Medal to Major-General George W. Goethals for his distinguished service to the nation and to the commercial world in connection with the construction of the Panama Canal.

The Charles P. Daly Medal to Professor George G. Chisholm for his contributions in creating a world-wide interest in the geographical basis of commerce.

The David Livingstone Medal to Manuel Vicente Ballivian, who, by the broad scholarship displayed in his own researches, by his efforts to secure government aid for geographical work, and by his encouragement of explorers, has done much for the promotion of geographical knowledge in Bolivia.

The *Annals of the Association of American Geographers,* published through this Society as heretofore, have been accepted as a valuable contribution to science and to teachers and students of geography.

The building of the Society has been open every day of the year with the exception of holidays for the accommodation of the public and for the exhibition of maps and other publications of interest in connection with passing events. The visitors who availed themselves of the opportunity to inspect or study the collections numbered 33,006.

The financial situation of the Society is excellent, as shown by the report of the Treasurer, of which a summary is annexed hereto, showing current revenues and expenditures. Generous gifts have been received from friends for special purposes, either in the conduct of specific undertakings or for the acquisition of designated properties. This general acknowledgment is all that is allowed by the generous donors.

The members of the staff have shown a most commendable spirit in meeting certain calls upon them arising out of the conditions heretofore alluded to. Their zeal and efficiency have been much appreciated.

Respectfully submitted on behalf of the Council

John Greenough
Chairman

Report of the Treasurer for 1917

The following is a statement of the income account and the condensed balance sheet of the Society as shown by the books on December 31, 1917:

Income Account

During the year there has been received for annual dues, interest on investments, and sales of publications	$55,819.61
There has been expended for salaries, house expenses, library, meetings, publications, postage, insurance, etc.	50,586.29
Carried to Balance Sheet	$5,233.32

Condensed Balance Sheet

Cash	$26,224.78	Capital uninvested	$3,691.22
Temporary investments	25,194.44	Sundry deposits	39,213.01
Sundry debits	63.33	Annual dues paid in advance	3,345.00
		Balance of income account	5,233.32
	$51,482.55		$51,482.55

Henry Parish
Treasurer

Report of the Special Committee

The Special Committee appointed December 20, 1917, to nominate and invite suitable persons to fill vacancies which will occur in the offices of the Society at the date of its annual meeting in January, 1918, respectfully report that they recommend the election of the following gentlemen to the offices designated:

		TERM TO EXPIRE IN
President	John Greenough	1919
Vice-President	Anton A. Raven	1921
Foreign Corresponding Secretary	William Libbey	1921
Treasurer	Henry Parish	1919
Councilors	Banyer Clarkson	1921
	Edwin Swift Balch	1921
	W. Redmond Cross	1921
	Walter B. James, M.D.	1921
	H. Stuart Hotchkiss	1921

Hamilton Fish Kean
James B. Ford *Committee*
Allison V. Armour

The reports of the Council and the Treasurer were approved and ordered on file. The persons recommended by the Special Committee for the offices to be filled received the unanimous vote of the Society and were declared duly elected.

President Greenough thereupon submitted for confirmation the names of 20 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society.

The lecture for the evening was entitled "Results of Several Journeys of Exploration in the Northwestern Amazon Basin," by Dr. Hamilton Rice. Dr. Rice took his hearers on an imaginary journey across the South American continent from Bogotá to the mouth of the Amazon, drawing mainly on the observations of his 1911-13 and 1916-17 trips. He described in detail his surveys of the Inirida, Içana, and Uaupés Rivers—surveys which have cleared up so much of the large unknown tract in the northwestern quadrant of the Amazon Basin. Dr. Rice briefly explained the methods used in making a reconnaissance survey such as he had undertaken, illustrating his words by lantern slides showing pages from his field notes, the taking of observations for latitude and longitude with a transit-theodolite, etc. The use of wireless telegraphy on his latest expedition, when communication with Arlington, Va., was easily maintained, was dwelt upon and the general use of this method in future exploratory work for the determination of longitudes predicted.

At an extra inter-monthly meeting on January 8 Mr. Henry Charles Woods, late British Vice-Consul at Adana, Asia Minor, addressed the Society on "The Bagdad Railway in the War." After outlining the course and present state of completion of the Bagdad Railway and its branches (see the maps in *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, facing p. 936, and *Geogr. Rev.*, Vol. 1, 1916, facing p. 288) Mr. Woods described its strategic importance in the present war. The resistance of the Turks on the Mesopotamian and Palestine fronts, as well as their frustrated attack on the Suez Canal, were mainly made possible by the facilities for the movement of troops and supplies afforded by this artery. Since the recent opening of the Taurus and Amanus tunnels there is continuous rail connection between Constantinople and Nesibin, at least. The isolated section of the railroad from Bagdad to Samara, a distance of 75 miles, is now in British hands.

NORTH AMERICA

The Catskill Water System and the History of New York City's Water Supply. In the annals of hydraulic engineering the construction of New York City's new waterworks must surely rank as an epic undertaking. From Ashokan, the beautiful man-made lake in the Catskills, water is brought 120 miles to Staten Island, a journey taking almost three days. From a height of 500 feet on leaving the lake the water descends at the Storm King crossing of the Hudson to 1,100 feet below sea level; in its journey through the city it passes 18 miles through a tunnel cut in solid rock, the longest tunnel in the world, and on the final stage to the Staten Island reservoir the water is carried under the Narrows of the harbor. The formal opening of this great system in the fall of 1917 marked an event to which New York and its leading institutions justly paid tribute. To the commemoration the American Geographical Society contributed by the compilation of a "Selected List of Books and Maps Relating to the Water Supply of New York City" (pamphlet of 8 pp.). Among the permanent contributions of other bodies may be noted "The Water Supply of New York City: A Brief History of Its Development from the Earliest Days to the Present Time" (Appendix C, pp. 487-566, *22nd Annual Rept. Amer. Scenic and Historic Preservation Soc., 1917*, Albany, 1917). This historical summary outlines the water supply problem that has always been before New York since the need arose for an artificial supply to supplement the natural resources of the abundant ponds, brooks, and springs.

The earliest artificial supply was provided by wells, but the structure of lower Manhattan Island is not favorable for such a source, the alluvial deposits overlying the rock bottom being readily permeated by the salty water of the Hudson and East Rivers. As the city grew and the need for prevention of fire increased, pumps, introduced in the first half of the eighteenth century, came into general use, and the water supply became a municipal affair. But the city began to outgrow the local resources. Serious epidemics of yellow fever and cholera during the later years of the eighteenth and the early nineteenth century emphasized the need for a revolution in the system of water supply. As early as 1798 the Bronx River was proposed as a source of supply, but the first effectual step towards the development of an exterior source may be dated at 1831, when the assertion was accepted that ''the Croton River could be carried into the City of New York, and that without it a supply adequate to the present and future wants of the city could not be obtained.'' At this time the population of the city amounted to 200,000. Six years later work was commenced on the Croton Aqueduct, and by 1842 Croton water was being delivered. But in less than a decade the city population had advanced to over 500,000, and the storage capacity of the Croton system was insufficient to meet seasons of serious drought. The Central Park Reservoir was added, and, as the phenomenal growth of the city continued, other reservoirs followed. By 1893 the New Croton Aqueduct, with a capacity of 300,000,000 gallons per day, had commenced delivery to the population, now exceeding 1,500,000.

Extension of the Croton system continued, until by 1911 a stage had been reached beyond which further development was economically impossible. New York, now growing at the rate of about 175,000 persons a year, must look still farther afield for sources of supply. For physical reasons and reasons of state policy selection rested with the Catskills, a region of sparse population with a topography favoring heavy run-off and satisfying storage needs (cf. C. P. Berkey: Geology of the New York City (Catskill) Aqueduct, *New York State Museum Bull. 146*, Albany, 1911; *idem:* The Catskill Water Supply for New York City, *Journ. of Geogr.*, Vol. 10, 1911-12, pp. 231-237; and Thaddeus Merriman: Rainfall and Run-off of the Catskill Mountain Region, *Monthly Weather Rev.*, Vol. 35, 1907, pp. 109-118). In the Catskills watersheds aggregating over 900 square miles and affording a capacity estimated at 760,000,000 gallons per day have been acquired. At present only one section, the Esopus watershed, with its reservoir of Ashokan, has been developed. East of the Hudson and 30 miles north of the city (City Hall) has also been built a storage and emergency reservoir (Kensico). The magnitude of this part of the undertaking may be gaged from the fact that an army of 4,500 men was employed on the building of these two great reservoirs alone. Further development will be prosecuted as needs arise, and thus, for some few years at least, the water requirements of the city are assured.

Recent Growth of the Fur Trade in the United States. The fur trade of the United States is one of the country's businesses that have been greatly modified by the war. In pre-war years the trade was dependent in considerable measure upon Europe, both in manufacturing and sales: for dyeing and finishing upon the great fur industry of Leipzig; on London and to a less extent on the Russian fairs for the fur sales. In 1915 the first plant for dyeing and finishing the Alaskan seal skins was opened in St. Louis; it has been highly successful. In 1915 the same city held the first public auction of Government seal skins, since when regular auctions have been held there and in New York. The amount realized at the New York and St. Louis sales in October last was over $5,000,000 (J. C. Austrian: The United States as a Fur Market, *Dun's Rev.: Internatl. Edit.*, Dec., 1917). While the import of foreign undressed and manufactured furs has remained greatly diminished (1916), the imports of dressed furs has practically recovered, but with a noteworthy change of origin (*Commerce Repts.*, Nov. 15, 1916, pp. 617-619). The loss occasioned by the removal of Germany from the fur market has been made up by increased imports from Great Britain, Canada, France, Australia, and Argentina. The gain by the two last-named is particularly interesting. From an insignificant figure in 1913 the Argentine import suddenly jumped to over $1,000,000 out of a total of $17,000,000. It is this market that is supplying the greater part of the present popular nutria fur. The import from Australia, also greatly increased, is composed in part of rabbit skins, a substitute for those heretofore coming from Germany, Belgium, and France.

Peat, An Unutilized Resource of Minnesota. A glance at the agricultural maps of Minnesota in the ''Minnesota Number'' of the *Journal of Geography* (Feb., 1916) suggests the differentiation of the state into two economic areas, an agriculturally developed south and west and an agriculturally undeveloped northeast, the area of the large-sized countries. The latter is the region of coniferous forest, and it is the forest alone that has provided the single vegetal resource exploited commercially, though it is not the only one in prospect. For northern Minnesota possesses an untouched heritage from the Ice Age—peat deposits, among the largest and deepest on the continent. The glacial topography, with its gently undulating belts of drift and its quondam lake flats, has provided an ideal surface for peat accumulation, to which the still considerable water surface adds favorably humid atmospheric conditions. It is estimated that over 5,000,000 acres in the state are covered with peat to a depth of at least five feet, the minimum workable depth (E. K. Soper: The Peat Deposits of Minnesota, *Econ. Geol.*, Sept., 1917), and the largest and best lie on the unproductive surface of the northeastern area. How to make these deposits commercially profitable is still an unsolved problem. Peat has been used most generally as a fuel, but its calorific value is low, inferior to that of lignite; and as a fuel it has only been used to advantage in regions where superior fuels are lacking, as in Scandinavia, or are undeveloped, as in Russia, where 4,000,000 tons of peat are produced annually (Louis Renié: L'industrie de la tourbe, *La Nature*, May 26, 1917). Though possibilities of a machine peat industry for domestic fuel are not wanting, a greater future would seem to lie in the utilization of peat for power production. Peat producer-gas plants have proved successful for such a purpose in Europe. Further, the process affords a valuable by-product, ammonium sulphate, esteemed as a fertilizer for its high content of nitrogen. In relation to this scheme the great iron-mining areas of northeastern Minnesota have an important bearing. Besides minor industrial uses there also exists the possibility of using large tracts of shallow peat land for agriculture, a purpose which, again, would be highly advantageous to the industrial sections of this part of the state.

SOUTH AMERICA

The Chilean-Argentine Boundary in Beagle Channel, Tierra del Fuego. Two diminutive islands, almost unknown to geographers, navigators, or traders, have brought up a new boundary discussion between Chile and Argentina. As the value of islands does not depend upon their area (witness Manhattan and Heligoland), the question of ownership may be important even in remote Tierra del Fuego. The dispute concerns the islands of Picton and New, situated near the entrance to Beagle Channel. By a treaty of 1881 the boundary was to follow the meridian of Cape Espiritu Santo until it reached Beagle Channel. From there it turned eastward along the Channel, the islands on the south being recognized as Chilean. In the following years maps of both countries assigned all the southern islands to Chile, but in 1891 Argentine explorers decided that Beagle Channel had been wrongly represented and that Moat Bay, the eastern of two channels into which it may be considered here to be divided by Picton Island and New Island, does not constitute its eastern entrance. This would leave the ownership of the islands uncertain. The matter really hinges on the question as to whether magnetic or astronomic north was meant by the discoverers of the Channel. Captains Fitz-Roy and King, who commanded the English expeditions of 1826-36, and Darwin, who accompanied the second expedition, state that the entrance to Beagle Channel lies *north of Lennox Island*, an island that lies athwart the western channel and subdivides it again into two branches (for relative locations see map in *Geogr. Rev.*, Vol. 3, 1917, p. 177). The magnetic declination then averaged 24° east in that region. Chart No. 2207 of the U. S. Hydrographic Office gives 16° 35′ as the declination for 1915, with a yearly decrease of 5′. Hence the doubt as to the location of various points. Even the statement that Beagle Channel runs almost directly east and west and is about 120 miles long does not clear the matter entirely, since the western entrance is formed of two unequal arms.

The islands in question are inhabited only by a few Indians (see C. W. Furlong's description of the Fuegian tribes and their environment, *Geogr. Rev.*, Vol. 3, 1917, pp. 1-15 and 169-187). White settlements have been attempted at various times but without success. The natural resources are meager, consisting of a small amount of timber and some fair grazing land. It was upon the Tierra del Fuego coast near here that Allen Gardiner and his party of English missionaries starved to death in 1850. The chill winds of the Antarctic alternate with western storms, and 65 per cent of the days are cloudy (Walter G. Davis: Climate of the Argentine Republic, Argentine Meteorological Office, Buenos Aires, 1910). It is possible but not probable that the islands may come to have strategic importance.

The Argentine position has been presented in the "Derrotero del Canal de Beagle" published by the Sección Hidrográfica del Ministerio de Marina (Buenos Aires, 1901), in the "Memoria de los trabajos efectuados en el Canal Beagle, 1899-1900," by the same department (Buenos Aires, 1912), and in a series of editorials in *La Prensa* of Buenos

Aires in January and February, 1915, by Dr. Estanislao S. Zeballos. Chile's claim is defended by J. Guillermo Guerra, professor of international law in the University of Chile (''La soberanía chilena en las islas al sur del Canal Beagle,'' Santiago, 1917). The three volumes ''Narrative of the Surveying Voyages of His Majesty's Ships *Adventure* and *Beagle*'' (London, 1839) prepared by King, Fitz-Roy, and Darwin give a full description of Beagle Channel and adjoining lands. The character of the islands New and Picton is described at length in ''Tierra del Fuego'' by W. Parker Snow (London, 1857). Colonel Holdich in his ''Countries of the King's Award'' (London, 1904) devotes a chapter to this region, painting some charming word pictures of the scenery. The maps printed in the two countries afford interesting comparisons. The mere fact that the dispute has arisen shows that the development of South America is drawing attention even to the most remote corners of the continent.

British Guiana as an Exporter of Rice. To the credit of British Guiana stands a rapid development in cereal production. At the close of the last century the colony, almost wholly dependent on its sugar industry, imported annually about 40,000,000 pounds of rice. Today, while sugar is still the mainstay of the colony—forming 70 per cent of the export—rice cultivation has attained a stage where the product figures as an economically important export: in 1916 over 29,000,000 tons were shipped from British Guiana to the West Indies and the neighboring French and Dutch colonies. There is much in favor of this development. The abandoned sugar plantations of the flat coast lands, empoldered and easily irrigated, provide the right physical conditions. The East Indian who forms so large an element of the population is a cultivator trained by generations of labor in the rice field, and the hand work which he cannot supply should be replaced by mechanical devices (*Suppl. to Commerce Repts. No. 44a,* Oct. 29, 1917, and *Dun's Rev.: Internatl. Edit.,* Nov. 1917, p. 56).

EUROPE

Friuli, the Eastern Gate of the North Italian Plain. The plain, at least the comparatively small plain, is a feature suggesting geographical uniformity, and it is surprising to hear of the distinction of the North Italian plain into no less than 27 anthropogeographic types (Arrigo Lorenzi: Studi sui tipi antropogeografici della pianura padana, *Riv. Geogr. Ital.,* Vol. 21, 1914, pp. 269-354, 402-450, 497-530, 576-604). Analyzing the bases of this diversity E. Bénévent finds the most powerful determinant to lie in the hydrologic conditions of the plain (La plaine du Po: Étude de géographie humaine d'après le livre de M. Arrigo Lorenzi, *Rec. des Trav. de l'Inst. de Géogr. Alpine,* Vol. 4, No. 2, 1916, Grenoble).

North of the Po these hydrologic conditions divide the plain into three well-marked belts. On the Alpine borders coarse deposits at the heads of the alluvial fans are distinguished by their porosity and consequent aridity, an aridity made yet more pronounced by the dry summers. The streams, moreover, cut across the fans in channels too deep-sunk to permit the use of their waters for irrigation. Towards the base of the alluvial fans the rain water, sucked up by the greedy gravels higher up, reappears as a line of springs, and the streams, here graded, also offer water for irrigation. Below this second most-favored zone is a belt suffering from excess of water; the streams are raising their beds on natural levees, and drainage is the chief consideration. By proper provision for irrigation or drainage the second and third zones are susceptible of improvement towards great productivity, but under primitive cultivation distinction between the three zones is not great. While political instability existed such essentially co-operative works as those of irrigation and drainage could not be undertaken, but when the revolution of the nineteenth century brought peace and established order rapid progress appeared in the second and third zones, varying in degree with details of hydrography and soil. Today there are wide differences where fifty years ago modes of life had much in common. It is a far cry from the Piedmont rice farms, whose vastness recalls the Brazilian *fazenda,* or the equally great establishments of the dyked lands in the Po delta, to the primitive communal cultivation of the dry Piedmont foothills or the barren *magredi* of Friuli.

Of all the provinces of the plain Friuli is perhaps the most interesting. Here the greatest diversity of factors comes into operation (see also Raoul Blanchard: Le Front Italien, *Revue de Paris,* Sept. 15, 1915). As the eastern portal of the North Italian plain Friuli has always been a province apart, a transition zone geographically, a frontier zone politically. The geographic change is not sharp. Differentiation indeed commences east of the Adige, where begins the amphitheater of wild Venetian Pre-Alps, giving source to a drainage system distinct from that of the Po basin. Here are no glacier-fed, lake-regulated streams, but a local system of irregular torrents. In Venetia proper the calcareous plateau intervening between the heights and the plain serves to some extent as a means of control, but beyond the Piave the rude mountains frown directly down on the lowland. Here, too, heavier spring and autumn rains combine with the more rapid run-off to heighten the torrential nature of the streams. The volume of the Tagliamento where it debouches on the plain has been known to increase in a day or two from 40 to 9,000 cubic meters. In their recent advance across the plain of Friuli the Austro-Germans were favored by comparatively light rains and a low state of the rivers. A characteristic sudden rise would at least have delayed the rapidity of their movement. In sympathy with this stream regimen the alluvial fans of western Friuli attain a great areal development and a maximum of porosity and aridity; in places water is not to be found at depths of 100 meters. The country is steppe; wide spaces provide only scant pasture; cultivation is found only near the villages aligned along the mountain torrents. Property here is still held communally. Farther east, around Udine and Gorizia, conditions ameliorate, the soil becomes less permeable and more fertile and rains more abundant. Villages are smaller—for water is better distributed—but much more numerous. With irrigation much might be done; as yet it is scarcely attempted: the region is in a frontier zone of insecurity. Everywhere frontier characteristics are exhibited, from the dialect bizarre with its words of Slav origin to the walled villages bespeaking the ancient fear of the invader. And if progress in the higher zones is retarded, still more so is it in the sea borders. About the Piave drainage has made rich lands available for cultivation—the lands now flooded for the defence of Venice, but between the Tagliamento and the Isonzo vast marshes bordering the lagoon remain in their primitive condition. They are desolate wastes, cutting off the hinterland from access to the sea. The backwardness of Friuli has an historical as well as a physical basis.

AFRICA

The Uganda Railroad in the Development of East Africa. During the years immediately following the partition of Africa (1884) our rapidly increasing knowledge of the central regions made patent the extent and influence of the slave trade, whose horrors had been first revealed by Livingstone. Need for the suppression of this shameful traffic led to the Brussels Conference (1890), wherein among the measures recommended was development by the interested Powers of means of communication, especially railroads in the respective territories. As a matter of national duty and political expediency Great Britain complied with the obligation of the conference by building the Uganda Railroad through her East African sphere of influence. The result might be described as magical: the line not only fulfilled the humanitarian and strategic expectations; it "literally created a country." Today the Uganda line remains the dominant influence of British East Africa, and its economic sphere extends far over Uganda and over a part of German East Africa. As may be anticipated the annual *Administration Report of the Railways of East Africa and Uganda* is a document of great geographical interest, and this is particularly so in the case of the current report, for the year 1916-17 (Nairobi, 1917), wherein war conditions have tested out the merits of the line. Discounting the invaluable military services of the line in the German East African campaign and eliminating the figures of traffic accruing from this source, the prosperity of the line in wartime remains significant, as the following table shows (values given in round numbers in rupees):

Year	*Up Traffic*	*Down Traffic*
1910-11	1,790,000	770,000
1913-14	3,860,000	1,420,000
1914-15	2,470,000	1,000,000
1915-16	2,390,000	1,000,000
1916-17	2,940,000	1,380,000

During the three years of the war no traffic came from the German possession, which has normally accounted for about one-fifth of the total. Including revenues from military transport the net earnings of the Uganda line have steadily increased from the small credit of the second year of operation (1904-05) to a gain of about $1,750,000 in 1916-17.

The prospects for future expansion are two-fold. Cotton and coffee cultivation, upon which the line is chiefly dependent, will expand and with their expansion the status of native civilization will also increase, swelling the import as well as the export trade. Another prospect lies in the progress of white colonization. The highlands of British East Africa constitute the most extensive area in equatorial Africa where the white man can look for a permanent home. The possibilities of the highlands have long been recognized or at least suspected. They have been the site of visionary colonization projects;

but definite proof of their suitability for white colonization also exists, as the Boer families established on the Uasin Gishu plateau east of Mt. Elgon attest. The latest project, recorded in *United Empire* for September, 1917 (H. R. Tate: British East Africa), aims at establishing on the land soldiers of European extraction who have served in the present war in East Africa or elsewhere. Success of such a scheme would appear, however, to be largely dependent on the facilitation of communication. Of especial importance, then, in this regard is the survey by the railroad administration for a line over the Uasin Gishu plateau. The proposed road will probably constitute a portion of a future trunk line to Uganda and the Congo and apparently would serve one of the three chief districts designated for the proposed colonization.

One other item of the report merits attention at this time when the future of colonial administration is in the balance. The native problem is the crux of the question. Its solution must be largely determined by the estimate of the native's capacity for civilization. Twenty years ago the native of British East Africa—as distinct from Uganda—was considered hopeless and useless. "Native labor is of little value, no dependence can be placed upon it, and even famine fails to force the tribes to seek work." Today that opinion has been changed to a belief that, trained and educated, the native can supply labor skilled as well as unskilled for all the manufacturing and industrial enterprises of the protectorate. The railroad provides an example of remarkable progress in industrial education in the 9,000 Africans working upon it.

A New Abyssinian Potash Deposit. The economic factor, especially in its aspect of mineral wealth, has been one of the most provocative factors in the precipitation of boundary disputes. The Alsace-Lorraine question has its economic side based on the iron deposits of the frontier-zone. The Chilo-Peruvian War of 1879-83 for possession of the nitrate fields is a notorious example. Even Central Africa, whose mineral resources are so little known, has been vexed by this question. Recognition of the value of the Katwe salt deposits on the Congo-Uganda boundary led to a reinvestigation of the original delimitation and a necessity for fixing the "wandering" meridian of 30° E. A later case is that arising from the discovery of that rare natural deposit, soluble salts of potash, in the undelimited frontier region between Eritrea and Abyssinia, some 50 miles inland from the hitherto insignificant Red Sea port of Fatimari (15° S. and 40¼° E.). The mineral, at first thought to be in Italian territory, is now for the time being conceded to lie in Abyssinia (*Commerce Repts.*, July 20, 1917). The discovery was made in 1911, but as the locality is a barren waterless district far from any established port, little interest was aroused. At that time the only deposits in course of commercial exploitation were those of Strassfurt and the newly opened mines of Mülhausen, the world monopoly thus being in the hands of Germany. When the war removed Germany from the potash market exploitation of the African deposit was hurriedly commenced. A good deal of potash has already been shipped on camel back to the coast and a railroad and port are in the course of construction.

The deposit differs from those of Alsace and Catalonia (still undeveloped), which are of Tertiary age, and that of Stassfurt, which is Permian, in that it is of recent formation. the product of evaporation from a former arm of the sea in a depression pertaining to the great rift system of East Africa (P. Sallior: Gisements de potasse nouveaux, *La Nature*, Nov. 24, 1917, summarized by T. E. Thorpe under "Sources of Potash," *Nature*, Jan. 3, 1918).

ASIA

The Punjab Irrigation System. The modification of the earth's surface and the turning to man's benefit of conditions naturally unfavorable is nowhere more marked than in irrigation development. The engineer, or literally "ingenious man," has before him the problem of co-operating with nature in a vast creative enterprise and in perfecting details which, from the human standpoint, have been left unfinished. It has been reserved for recent years and for modern ingenuity to bring to a high degree of development the distribution of water to dry lands which nature has been perfecting for thousands of years and human agencies for hundreds.

Perhaps the most notable instance in modern engineering of the utilization of geographical knowledge, including that of ancient times, is to be found in the Punjab region of India, the land known in the native tongue as the "Panj (five) ab (water or rivers)" (Sir John Benton: The Punjab Triple Canal System, *Minutes of Proc. of Inst. of Civil Engineers, London,* Vol. 201, Session 1915-16, Part I, 52 pp.; abstracted in *Engineering* (London), Nov. 19, 1915, p. 515). These five rivers flow southwesterly from the Himalayas and unite to form the mighty Indus. Before they join they flow through a rich alluvial country which is capable of supporting in comfort a much larger population than now exists if only one missing necessity can be supplied, and that is water. Because of the difference in their catchment areas the rivers are dissimilar in size and in regularity of flow. The larger and more dependable streams are so located that their waters can not readily be diverted to the neighboring lands, while the smaller streams, more easily controlled by the engineer, have been overcapitalized, as it were, that is, gravity canals have been built from them commanding areas larger than can be supplied. To rectify this condition, the British engineers in India have made extensive studies of the topography of the irrigable areas and have finally built large supply canals which enable the transfer of water from west to east, from the rivers where there is an abundance to those where it is deficient.

On the east of the central Punjab is a tract of more than 1,500,000 acres of fertile land which has been lying idle for want of water and which can not be supplied from any source near it, because the perennial supply from the nearer streams, the Sutlej, Ravi, and Chenab, had already been fully utilized. At the same time only about a quarter of the perennial flow carried by the more western stream, the Jhelum, had been diverted, the remainder flowing useless to the sea. The suggestion was made that this surplus should be diverted to the east for the irrigation of the dry fertile land. To do so necessitated the crossing of two of the eastern rivers, namely, the Chenab and the Rabi, and also of numerous and formidable hill torrents.

The project of taking the excess water easterly has finally been carried out by the construction of three separate but interconnecting canals. The first, known as the Upper Jhelum Canal, with a capacity of 8,500 cubic feet per second, takes water from the river of that name, carrying it southerly across the divide to the Chenab River. From this stream there had already been built what is known as the Lower Chenab Canal, which took out most of the available supply. This canal is sufficiently far down on the river to receive the water brought over by the Upper Jhelum Canal. Above the Lower Chenab Canal is a vast extent of excellent land which could not be reached by the older works. Another canal, therefore, the Upper Chenab Canal, the second in the series above noted, was built, with capacity at the head of 11,700 second-feet, to utilize the natural flow of the Chenab River. In so doing it would deprive the older Lower Chenab Canal of needed water were it not for the supply brought into the Chenab River by the Upper Jhelum Canal, which brings in as much water as the new Upper Chenab Canal takes out above.

The quantity received by the Upper Chenab Canal is such as to permit a certain amount to be carried through the system and to escape into the Rabi River. At this point there is a dam or barrage across the channel, and the third important canal, known as the Lower Bari Doab Canal, takes off a volume of 6,750 cubic feet per second.

Thus, by this system of three canals it has been possible to divert waters across a rough country from the largest stream on the west and to increase the flow in a smaller river, from which water is taken at a higher elevation and in an equivalent amount, to be transported across another natural divide into the third stream, from which in turn another canal takes off. The total length of these canals and their branches and distributing systems to the farms is nearly 23,000 miles.

The average rainfall is from 25 inches near the mountains to 10 inches out on the lower plains. In dry years the precipitation is about one-half this amount. Irrigation is carried on throughout the year, this being divided into two seasons, the cold, from October to March, and the hot, from April to September, when the rivers are flooded and when nearly 90 per cent of the annual rainfall occurs. During this time what is known as the *karif* crop is obtained. The cold half of the year, embracing the winter months, produces what is known as the *rabi* crop. The duty of water, that is to say, the number of acres irrigated by one cubic foot of water per second, is during the hot season about 100 acres and during the cold months 200 acres.

The lands are divided on the basis of about 25 acres to a family, and the annual charge for water is from $1.50 to $1.75 per acre. Out of a total irrigable area of approximately 4,000,000 acres one-half is irrigated by this system. It has not been considered wise to attempt to water a larger proportion at present because of the fact that under existing conditions there is a deficiency of fertilizers, there being little if any manure in the country. With the native system of agriculture the only successful way of renewing the soil is by alternate periods of cultivation and fallowing. The danger of waterlogging the soil is also reduced by irrigating only a portion of the tract.

The total investment has been about $30,000,000, and on this amount the completed works will return an interest of 8 per cent or over. In addition much financial benefit will accrue from increased returns to the railroads and other industries, so that the annual gains may be placed, possibly, at 15 per cent, in addition to the increased prosperity of the people who are transforming a drought-stricken famine country into one of the most highly productive portions of the earth. F. H. NEWELL.

PHYSICAL GEOGRAPHY

Rainfall and Battles. The widespread popular notion that gunfire produces rain will not die. It has come very prominently to the front again since the war began. In spite of all that scientific writers have done and are doing to overthrow this belief, the superstition, or prejudice, still persists. Recently, M. Alfred Angot, Director of the Bureau Central Météorologique de France, has presented the facts in the case clearly and authoritatively (*Comptes Rendus de l'Acad. d'Agric.*, No. 18, 1917, 3, pp. 501-508). Mixture of warm and cold air masses, as the result of explosions, might cause cloud formation or even a slight drizzle but never any considerable precipitation. Water vapor resulting from chemical reaction could not be a source of precipitation. An enormous amount of explosives would be required to produce even a small rainfall, and even then all the hydrogen in the explosive would have to become water vapor and condense at once (21,750 tons of melinite per square mile, to give 1 millimeter). Electrical action, resulting from the ionization produced by high explosives, and an excessive number of dust particles arising from the same source can do ''no more than accelerate a precipitation which would be necessitated sooner or later by the progressive cooling of the air.'' A careful study of the amounts and the frequency of rainfall in France since the war began fails to show any effects of the gunfiring. R. DEC. WARD

Can Seasonal Weather Forecasts Be Made from Ocean Water Movements? Seasonal weather forecasts can be made if the answers to these two questions are satisfactory: (1) How closely do ocean surface temperatures control the weather? and (2) To what extent is it possible to forecast the distribution of water-surface temperature departures over the oceans?

How can these be answered? Ocean temperatures directly affect the weather of leeward shores; and indirectly through modifications of pressure distribution they may control the weather far from the coast. The value of ocean temperatures for seasonal forecasts can, therefore, be determined (1) by direct comparison of weather with the water temperatures at the same time; and (2) by making classifications of types of water temperature distribution for each of the twelve months and then finding the similarities of the pressure distributions accompanying each occurrence of each type. With the typical pressure distributions which may be found connected with the types of water temperature distribution, the weather to be expected over wide areas can be easily determined.

Ocean currents and drifts have been observed so long that we know their general directions and rates of movement, in some cases even by months. Marked temperature departures must move in the waters in which they occur, though their identities may soon be lost through the great mixing of oceanic surface waters. In spite of mixing, however, more than a chance correlation is to be expected between great temperature departures in a current and those occurring even a year later thousands of miles away in the direction toward which the current flows. And if one makes combinations of temperature departures in the major currents which take part in the water flow to a distant area, the result may be found to approximate closely the temperatures as observed.

The tentative results already obtained from meager data seem to justify a thorough investigation of the temperature movements of ocean surface waters and their relation to the weather of the neighboring or even of distant continents. CHARLES F. BROOKS

GEOGRAPHICAL NEWS

Officers of the Association of American Geographers for 1918. The following officers have been elected by the Association of American Geographers for 1918:

President, Nevin M. Fenneman; *First Vice-President,* Charles R. Dryer; *Second Vice-President,* Bailey Willis; *Secretary,* Oliver L. Fassig; *Councilor,* Walter S. Tower; *Treasurer,* François E. Matthes.

PERSONAL

DR. W. C. FARABEE gave a lecture on his recent expedition under the title ''Exploration in the Valley of the Amazon'' before the Geographic Society of Chicago on December 14, 1917.

DR. ALEŠ HRDLIČKA, Curator of Physical Anthropology of the U. S. National Museum, addressed the Anthropological Society of Washington on October 2, 1917, on ''Bohemia and the Bohemians.''

PROFESSOR D. W. JOHNSON of Columbia University read a paper entitled ''The Physiography of the Italian Front'' before the New York Academy of Sciences on January 21.

MR. DONALD B. MACMILLAN, leader of the Crocker Land Expedition, gave a lecture before the Geographical Society of Philadelphia on December 5, 1917, on the activities of the expedition in the Arctic, entitled "In Search of New Arctic Lands."

MR. P. LEE PHILLIPS, Chief of the Division of Maps of the Library of Congress, is collecting data about Bernard Romans, 1720(?)-1784, author of the "Concise History of East and West Florida," for the purpose of reproducing his map of Florida, 1774, the only known copy of which is in the Library of Congress. Mr. Phillips desires to locate Romans' works, including other maps he compiled, and to find out the whereabouts of his manuscripts, especially the diary which he is supposed to have left. Any information on this matter would be gratefully received by Mr. Phillips. Ultimately a facsimile reproduction of the Romans map of Florida may be published similar to that of Filson's "Map of Kentucke," 1784, published by W. H. Loudermilk & Co. of Washington, D. C., under the editorship of Mr. Phillips.

DR. E. L. STEVENSON of the Hispanic Society of America gave a series of five lectures on "New World Cartography" at the University of California during November. The titles and dates were as follows: "Medieval Geography: The Heritage from Antiquity and the Contribution to Earth Knowledge in the Pre-Renaissance Period," November 21; "The Expansion of Geographical Knowledge in the Early Renaissance Period: Overland Exploration and Discovery in Regions beyond Europe, and the Beginnings of Trans-Oceanic Expansion," November 22; "The Earliest Explorations and Discoveries in the New World: Conceptions of the Geography of the Newly Found Regions, and the Record As Left by the Contemporary Map Makers," November 23; "The Progress of Discovery As Recorded in the Spanish and the Spanish-Italian Maps: The First Half-Century of New World Geography," November 26; "The Mapping of French and English Explorations in the New World," November 27.

DR. GRIFFITH TAYLOR of the Australian Commonwealth Bureau of Meteorology was awarded the gold medal of the Royal Geographical Society of Queensland at Melbourne on November 9, 1917. The award was made for a paper on the settlement of tropical Australia. The paper deals especially with the control of vegetation and settlement by temperature and rainfall and is related to the general line of research to which Dr. Taylor has been devoting himself since his return from the Antarctic, the published results of which have been discussed in the *Review* for May 1916, p. 396, Nov. 1917, pp. 401-403, and Jan. 1918, pp. 77 and 86. The paper, which is accompanied by numerous original maps and diagrams, will be published in 1918 by the Queensland Branch of the Royal Geographical Society of Australasia, Brisbane.

MR. NORMAN TAYLOR is giving a course on phytogeography at the Brooklyn Botanic Garden.

MR. H. CHARLES WOODS, who lectured before this Society on January 8, delivered his lecture on "The Bagdad Railway in the War" before the Geographical Society of Philadelphia on January 18.